

# CLAIMS

1. An isolated nucleic acid comprising a nucleotide sequence of one of SEQ ID NO: 27;  
SEQ ID NO: 29; SEQ ID NO: 31; SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37;  
SEQ ID NO: 38; SEQ ID NO: 40; SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46;  
5 SEQ ID NO: 48; SEQ ID NO: 50; SEQ ID NO: 51; SEQ ID NO: 52; SEQ ID NO: 60;  
SEQ ID NO: 61 , or a sequence complementary thereto.
2. An isolated nucleic acid comprising a nucleotide sequence which hybridizes under  
stringent conditions to one of SEQ ID NO: 27; SEQ ID NO: 29; SEQ ID NO: 31; SEQ ID  
NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38; SEQ ID NO: 40; SEQ ID  
10 NO: 42; SEQ ID NO: 44; SEQ ID NO: 46; SEQ ID NO: 48; SEQ ID NO: 50; SEQ ID  
NO: 51; SEQ ID NO: 52; SEQ ID NO: 60; SEQ ID NO: 61 , or a sequence  
complementary thereto.
3. An isolated nucleic acid comprising a nucleotide sequence having at least about 80%  
identity to a sequence corresponding to at least about 15 consecutive nucleotides of one  
15 of SEQ ID NO: 27; SEQ ID NO: 29; SEQ ID NO: 31; SEQ ID NO: 33; SEQ ID NO: 35;  
SEQ ID NO: 37; SEQ ID NO: 38; SEQ ID NO: 40; SEQ ID NO: 42; SEQ ID NO: 44;  
SEQ ID NO: 46; SEQ ID NO: 48; SEQ ID NO: 50; SEQ ID NO: 51; SEQ ID NO: 52;  
SEQ ID NO: 60; SEQ ID NO: 61, or a sequence complementary thereto.
4. An isolated nucleic acid comprising a nucleotide sequence having at least about 80%  
20 identity to a sequence corresponding to one of SEQ ID NO: 27; SEQ ID NO: 29; SEQ ID  
NO: 31; SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38 wherein  
said nucleic acid sequence encodes a polypeptide or protein which interacts in yeast two-  
hybrid system with APC.
5. An isolated nucleic acid comprising a nucleotide sequence having at least about 80%  
25 identity to a sequence corresponding to one of SEQ ID NO: 40; SEQ ID NO: 42; SEQ ID  
NO: 44; SEQ ID NO: 46 wherein said nucleic acid sequence encodes a polypeptide or  
protein which interacts in yeast two-hybrid system with E12.

6. An isolated nucleic acid encoding a polypeptide of one of SEQ ID NO: 28; SEQ ID NO: 30; SEQ ID NO: 32; SEQ ID NO: 34; SEQ ID NO: 36; SEQ ID NO: 41; SEQ ID NO: 43; SEQ ID NO: 45; SEQ ID NO: 47; or SEQ ID NO: 49.
7. The isolated nucleic acid according to claim 1, further comprising a transcriptional regulatory sequence operatively linked to said nucleotide sequence so as to render said nucleotide sequence suitable for use as an expression vector.
8. An expression vector comprising the nucleic acid of claim 4.
9. A host cell transfected with the expression vector of claim 5.
10. A transgenic animal having a transgene comprising a nucleic acid of claim 1 incorporated in cells thereof, which transgene modifies the level of expression of the nucleic acid, the stability of an mRNA transcript of the nucleic acid, or the activity of the polypeptide encoded by the nucleic acid.
11. An isolated nucleic acid which hybridizes under stringent conditions to at least 12 consecutive nucleotides of one of SEQ ID NO: 27; SEQ ID NO: 29; SEQ ID NO: 31; SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38; SEQ ID NO: 40; SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46; SEQ ID NO: 48; SEQ ID NO: 50; SEQ ID NO: 51; SEQ ID NO: 52; SEQ ID NO: 60; SEQ ID NO: 61.
12. An isolated polypeptide having an amino acid sequence comprising at least 25 amino acids encoded by a nucleic acid of claim 1.
13. A polypeptide of one of SEQ ID NO: 28; SEQ ID NO: 30; SEQ ID NO: 32; SEQ ID NO: 34; SEQ ID NO: 36; SEQ ID NO: 41; SEQ ID NO: 43; SEQ ID NO: 45; SEQ ID NO: 47; or SEQ ID NO: 49.
14. A probe/primer comprising a substantially purified oligonucleotide, said oligonucleotide containing a region of nucleotide sequence which hybridizes under stringent conditions to at least about 12 consecutive nucleotides of one of SEQ ID NO: 27; SEQ ID NO: 29; SEQ ID NO: 31; SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38; SEQ ID NO: 40; SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46; SEQ ID NO: 48;

SEQ ID NO: 50; SEQ ID NO: 51; SEQ ID NO: 52; SEQ ID NO: 60; SEQ ID NO: 61, or a sequence complementary thereto.

15. An array comprising at least 10 different oligonucleotides of claim 14 attached to a solid support.
- 5 16. The probe/primer of claim 15, further comprising a detectable label group attached thereto.
17. The probe/primer of claim 16, wherein said detectable label group is selected from the group consisting of radioisotopes, fluorescent compounds, enzymes and enzyme co-factors.
- 10 18. An antibody immunoreactive with a polypeptide of claim 12.
19. An antibody immunoreactive with a polypeptide of claim 13.
20. An antisense oligonucleotide which hybridizes under stringent conditions to at least 12 consecutive nucleotides of one of SEQ ID NO: 27; SEQ ID NO: 29; SEQ ID NO: 31; SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38; SEQ ID NO: 40; 15 SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46; SEQ ID NO: 48; SEQ ID NO: 50; SEQ ID NO: 51; SEQ ID NO: 52; SEQ ID NO: 60; SEQ ID NO: 61, or a sequence complementary thereto.
21. A test kit for determining the phenotype of a cell, comprising a probe/primer wherein said test kit is capable of measuring a level of a nucleic acid comprising nucleic acid of 20 one ore more of SEQ ID NO: 27; SEQ ID NO: 29; SEQ ID NO: 31; SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38; SEQ ID NO: 40; SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46; SEQ ID NO: 48; SEQ ID NO: 50; SEQ ID NO: 51; SEQ ID NO: 52; SEQ ID NO: 60; SEQ ID NO: 61, or a sequence complementary thereto in a sample of cells isolated from a patient.
- 25 22. A test kit for determining the phenotype of a cell, comprising a probe/primer wherein said test kit is capable of measuring a level of a nucleic acid hybridizing under stringent conditions to one ore more nucleic acid of SEQ ID NO: 27; SEQ ID NO: 29; SEQ ID

NO: 31; SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38; SEQ ID NO: 40; SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46; SEQ ID NO: 48; SEQ ID NO: 50; SEQ ID NO: 51; SEQ ID NO: 52; SEQ ID NO: 60; SEQ ID NO: 61, or a sequence complementary thereto in a sample of cells isolated from a patient.

- 5 23. A test kit for determining the phenotype of a transformed cell, said test kit comprising an antibody specific for a polypeptide comprising amino acid sequence encoded by a nucleic acid which hybridizes under stringent conditions to any one of SEQ ID NO: 27; SEQ ID NO: 29; SEQ ID NO: 31; SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38; SEQ ID NO: 40; SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46; SEQ ID NO: 48; SEQ ID NO: 50; SEQ ID NO: 51; SEQ ID NO: 52; SEQ ID NO: 60; SEQ ID NO: 61.
- 10 24. A method of determining the phenotype of a cell, comprising detecting differential expression, relative to a normal cell, of at least one nucleic acid comprising of SEQ ID NO: 27; SEQ ID NO: 29; SEQ ID NO: 31; SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38; SEQ ID NO: 40; SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46; SEQ ID NO: 48; SEQ ID NO: 50; SEQ ID NO: 51; SEQ ID NO: 52; SEQ ID NO: 60; SEQ ID NO: 61, wherein the nucleic acid is differentially expressed by at least a factor of two.
- 15 25. A method of determining the phenotype of a cell, comprising detecting differential expression, relative to a normal cell, of at least one nucleic acid which hybridizes under stringent conditions to one of SEQ ID NO: 27; SEQ ID NO: 29; SEQ ID NO: 31; SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38; SEQ ID NO: 40; SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46; SEQ ID NO: 48; SEQ ID NO: 50; SEQ ID NO: 51; SEQ ID NO: 52; SEQ ID NO: 60; SEQ ID NO: 61, wherein the nucleic acid is differentially expressed by at least a factor of two.
- 20 26. A method for determining the phenotype of cells in a tissue sample from an individual, comprising:
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- (i.) providing a nucleic acid probe comprising a nucleotide sequence having at least 12 consecutive nucleotides of any of SEQ ID NO: 27; SEQ ID NO: 29; SEQ ID NO: 31; SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38; SEQ ID NO: 40; SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46; SEQ ID NO: 48; SEQ ID NO: 50; SEQ ID NO: 51; SEQ ID NO: 52; SEQ ID NO: 60; SEQ ID NO: 61, or a sequence complementary thereto;
  - (ii.) obtaining a first sample of tissue from an individual;
  - (iii.) providing a second sample of tissue which is substantially non-cancerous;
  - (iv.) contacting the nucleic acid probe with said first and second tissue sample under conditions which allow hybridization of said probe to said tissue sample; and
  - (v.) comparing (a) the amount of hybridization of the first tissue sample, with (b) the amount of hybridization of the probe of the second tissue sample, wherein a difference of at least by a factor of two in the amount of hybridization of the probe into the first tissue sample as compared to the amount of hybridization of the second tissue sample is indicative of the phenotype of cells in the first tissue sample.
27. A method of determining the phenotype of a cell, comprising detecting differential expression, relative to a normal cell, of at least one polypeptide comprising amino acid sequence encoded by a nucleic acid which hybridizes under stringent conditions to one of SEQ ID NO: 27; SEQ ID NO: 29; SEQ ID NO: 31; SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38; SEQ ID NO: 40; SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46; SEQ ID NO: 48; SEQ ID NO: 50; SEQ ID NO: 51; SEQ ID NO: 52; SEQ ID NO: 60; SEQ ID NO: 61, or a sequence complementary thereto, wherein the polypeptide is differentially expressed by at least a factor of two.
28. The method of claim 27, wherein the level of said protein is detected in an immunoassay.
29. A method for determining the presence or absence of a nucleic acid which hybridizes under stringent conditions to one of SEQ ID NO: 27; SEQ ID NO: 29; SEQ ID NO: 31;

SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38; SEQ ID NO: 40;  
 SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46; SEQ ID NO: 48; SEQ ID NO: 50;  
 SEQ ID NO: 51; SEQ ID NO: 52; SEQ ID NO: 60; SEQ ID NO: 61, or a sequence  
 complementary thereto in a cell, comprising contacting the cell with a probe/primer of  
 claim 14.

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30. A method for determining the presence of absence of a polypeptide comprising amino  
 acid sequence encoded by a nucleic acid of one of SEQ ID NO: 27; SEQ ID NO: 29;  
 SEQ ID NO: 31; SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38;  
 SEQ ID NO: 40; SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46; SEQ ID NO: 48;  
 10 SEQ ID NO: 50; SEQ ID NO: 51; SEQ ID NO: 52; SEQ ID NO: 60; SEQ ID NO: 61, or  
 a sequence complementary thereto in a cell, comprising contacting the cell with an  
 antibody of claim 18 or 19.

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31. A method for determining the presence of absence of a polypeptide encoded by a nucleic  
 acid which hybridizes under stringent conditions to one of SEQ ID NO: 27; SEQ ID NO:  
 29; SEQ ID NO: 31; SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38;  
 SEQ ID NO: 40; SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46; SEQ ID NO: 48;  
 SEQ ID NO: 50; SEQ ID NO: 51; SEQ ID NO: 52; SEQ ID NO: 60; SEQ ID NO: 61, or  
 a sequence complementary thereto in a cell, comprising contacting the cell with an  
 antibody of claim 18 or 19.

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32. A method for detecting a mutation in a test nucleic acid which hybridizes under stringent  
 conditions to a nucleic acid of one of SEQ ID NO: 27; SEQ ID NO: 29; SEQ ID NO: 31;  
 SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38; SEQ ID NO: 40;  
 SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46; SEQ ID NO: 48; SEQ ID NO: 50;  
 SEQ ID NO: 51; SEQ ID NO: 52; SEQ ID NO: 60; SEQ ID NO: 61, or a sequence  
 25 complementary thereto or a sequence complementary thereto, comprising

- i. collecting a tissue sample from an individual,
- ii. isolating nucleic acid from the cells of the tissue sample,

- iii. contacting the nucleic acid sample with one or more primers which specifically hybridize to a nucleic acid sequence of at least one of SEQ ID NO: 27; SEQ ID NO: 29; SEQ ID NO: 31; SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38; SEQ ID NO: 40; SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46; SEQ ID NO: 48; SEQ ID NO: 50; SEQ ID NO: 51; SEQ ID NO: 52; SEQ ID NO: 60; SEQ ID NO: 61, or a sequence complementary thereto under conditions which allow hybridization and amplification of the nucleic acid; and
- iv. comparing the presence, absence, or size of an amplification product to the amplification product of a normal cell.

33. A method for identifying an agent which alters the level of expression in a cell of a nucleic acid which hybridizes under stringent conditions to one of SEQ ID NO: 27; SEQ ID NO: 29; SEQ ID NO: 31; SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38; SEQ ID NO: 40; SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46; SEQ ID NO: 48; SEQ ID NO: 50; SEQ ID NO: 51; SEQ ID NO: 52; SEQ ID NO: 60; SEQ ID NO: 61, or a sequence complementary thereto, comprising

- (i.) providing a cell;
- (ii.) treating the cell with a test agent;
- (iii.) determining in the cell the level of expression of a nucleic acid which hybridizes under stringent conditions to one of SEQ ID NO: 27; SEQ ID NO: 29; SEQ ID NO: 31; SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38; SEQ ID NO: 40; SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46; SEQ ID NO: 48; SEQ ID NO: 50; SEQ ID NO: 51; SEQ ID NO: 52; SEQ ID NO: 60; SEQ ID NO: 61, or a sequence complementary thereto; and
- (iv.) comparing the level of expression of the nucleic acid in the treated cell with the level of expression of the nucleic acid in an untreated cell, wherein a change in the level of expression of the nucleic acid in the treated cell relative to the level of expression of the nucleic acid in the untreated cell is indicative of an agent which alters the level of expression of the nucleic acid in a cell.

34. The method of claim 28 where in the nucleic acid is a nucleic acid which hybridizes under stringent conditions to one of SEQ ID NO: 27; SEQ ID NO: 29; SEQ ID NO: 31; SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38; SEQ ID NO: 40; SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46; SEQ ID NO: 48; SEQ ID NO: 50; SEQ ID NO: 51; SEQ ID NO: 52; SEQ ID NO: 60; SEQ ID NO: 61, or a sequence complementary thereto
35. A pharmaceutical composition comprising an agent identified by the method of claim 33 or 34.
36. A pharmaceutical composition comprising a nucleotide sequence of at least one of SEQ ID NO: 27; SEQ ID NO: 29; SEQ ID NO: 31; SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38; SEQ ID NO: 40; SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46; SEQ ID NO: 48; SEQ ID NO: 50; SEQ ID NO: 51; SEQ ID NO: 52; SEQ ID NO: 60; SEQ ID NO: 61, or a sequence complementary thereto.
37. A pharmaceutical composition comprising a polypeptide comprising amino acid sequence encoded by a nucleic acid of at least one of SEQ ID NO: 27; SEQ ID NO: 29; SEQ ID NO: 31; SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38; SEQ ID NO: 40; SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46; SEQ ID NO: 48; SEQ ID NO: 50; SEQ ID NO: 51; SEQ ID NO: 52; SEQ ID NO: 60; SEQ ID NO: 61.
38. The method of claim 37 wherein the polypeptide comprises amino acid sequence encoded by a nucleic acid which hybridizes under stringent conditions with at least one of SEQ ID NO: 27; SEQ ID NO: 29; SEQ ID NO: 31; SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38; SEQ ID NO: 40; SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46; SEQ ID NO: 48; SEQ ID NO: 50; SEQ ID NO: 51; SEQ ID NO: 52; SEQ ID NO: 60; SEQ ID NO: 61.
39. A pharmaceutical composition wherein the polypeptide comprises amino acid sequence encoded by a nucleic acid which hybridizes under stringent conditions with at least one of SEQ ID NO: 27; SEQ ID NO: 29; SEQ ID NO: 31; SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38; and said polypeptide interacts with APC.



40. A pharmaceutical composition wherein the polypeptide is comprises amino acid sequence encoded by a nucleic acid which hybridizes under stringent conditions with at least one of SEQ ID NO: 40; SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46 and said polypeptide interacts with E12.
- 5 41. A method for detecting tumors in which one or more of SEQ ID NO: 27; SEQ ID NO: 29; SEQ ID NO: 31; SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38; SEQ ID NO: 40; SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46; SEQ ID NO: 48; SEQ ID NO: 50; SEQ ID NO: 51; SEQ ID NO: 52; SEQ ID NO: 60; SEQ ID NO: 61, or a sequence complementary thereto, are used as probes/primers, said method comprising:
  - 10 (i.) collecting a sample of cells from an individual,
  - (ii.) isolating nucleic acid from the cells of the sample,
  - (iii.) contacting the nucleic acid sample with one or more primers which specifically hybridize to a nucleic acid sequence of one or more of SEQ ID NO: 27; SEQ ID NO: 29; SEQ ID NO: 31; SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38; SEQ ID NO: 40; SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46; SEQ ID NO: 48; SEQ ID NO: 50; SEQ ID NO: 51; SEQ ID NO: 52; SEQ ID NO: 60; SEQ ID NO: 61, or a sequence complementary thereto under conditions which allow hybridization and amplification of the nucleic acid; and
  - 15 (iv.) comparing the presence, absence, or size of an amplification product to the amplification product of a normal cell.
- 20 42. The method of claim 41 in which said tumor is colon cancer.
43. A method for detecting tumor in a sample from an individual comprising contacting the sample with an antibody to a protein encoded by at least one of SEQ ID NO: 27; SEQ ID NO: 29; SEQ ID NO: 31; SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38; SEQ ID NO: 40; SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46; SEQ ID NO: 48; SEQ ID NO: 50; SEQ ID NO: 51; SEQ ID NO: 52; SEQ ID NO: 60; SEQ ID NO: 61.
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44. The method of claim 43 in which said tumor is colon cancer.
45. A probe for detecting the presence of colon cancer or a precursor of colon cancer,  
consisting essentially of an isolated nucleic acid of one of SEQ ID NO: 27; SEQ ID NO:  
29; SEQ ID NO: 31; SEQ ID NO: 33; SEQ ID NO: 35; SEQ ID NO: 37; SEQ ID NO: 38;  
5 SEQ ID NO: 40; SEQ ID NO: 42; SEQ ID NO: 44; SEQ ID NO: 46; SEQ ID NO: 48;  
SEQ ID NO: 50; SEQ ID NO: 51; SEQ ID NO: 52; SEQ ID NO: 60; SEQ ID NO: 61, or  
a sequence complementary thereto.